



# NITE-TIMES NEWS

CHICAGO AREA TIMEX USERS GROUP

Chicago Area Timex Users Group  
Volume 7, Number 3

Downers Grove, Illinois  
May/June 1993

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## C.A.T.U.G. CLUB OFFICERS

Here is the list of 1993 club officers and how to contact them. The club has two strong SIGs, SPECTRUM/TS2068 and QL. If you have questions about either of these fine machines or even the ZX81/TS1000/TS1500 call one of the officers. C=312, S=708.

POSITION	NAME	PHONE	PRIMARY FUNCTION
President	Nazir Pashtoon	S439-1679	The buck stops here...
Vice-President	Steve Cooper	S968-3553	Meeting Planning, etc.
Secretary	Jim Brezina	S832-1782	Records and Reporting
Treasurer	Frank Mills	S544-1918	Dues and Purchasing
Editor	Bob Swoger	S576-8068	Newsletter, BBS, etc.

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NITE-TIMES NEWS

## Nite-Times Information

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The Nite-Times News is the newsletter of the Chicago Area Timex Users Group. For an annual fee of \$12.00 you can become a CATUG member and receive six newsletters each year. Write your check payable to:

**FRANK MILLS**  
417 S 47th AVE  
BELLWOOD IL 60104

The Chicago Area Timex Users Group is pleased to exchange newsletters with other Timex and Sinclair supporting user groups at no charge. Send all newsletter requests to:

**CATUG EDITOR BOB SWOGER**  
613 PARKSIDE CIRCLE  
STREAMWOOD IL 60107-1647

If you desire to reprint any articles that appear here, please provide credit to the author and this newsletter.

We encourage your user group to copy this newsletter and distribute it at your regular meetings to your members free of any charge as we believe that this will encourage better meeting attendance. If you are a user group that feels as we do, please let us know in your newsletter so that we might do this for our members and keep our attendance up.

Articles originating from our group may be downloaded from our BBS and reprinted.

### CONTRIBUTORS TO THIS ISSUE

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**Cedric Bastiaans**  
**Jim Brezina**  
**Frank Mills**  
**Larry Sauter**  
**Bob Swoger, K9WVY**

### CLUB MEETINGS

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The Chicago Area Timex Users Group meets on the THIRD Saturday of each month at the home of our meeting coordinator

Steve Cooper in Downers Grove, Illinois from 1:00 to 5:00 PM. Steve's home is lovingly called the CLUB HOUSE and is located at 1300 Maple Street in Downers Grove just 2 blocks southwest of the Downers Grove Public Library. Steve should always be contacted evenings at 708/968-3553 to confirm the meeting schedule.

### TREASURY NOTES

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The balance as of Jun. 30, 1993 is \$351.73 Our current paid membership stands at 19.

Frank Mills, Treasurer  
Chicago Area Timex Users Group

### SECRETARY'S NOTEPAD

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**May 15, 1993**

The meeting was called to order at 2 P.M. Those present were Bob Swoger, John Donaldson, Nazir Pashtoon, Frank Mills, Steve Cooper, Abed Kahale, Jim Brezina, and a new member, Cy Herre.

Bob talked about the history of TSNUG, how and why it was formed and how its newsletter ZXir QLive Alive!, got its name. Al Feng, a QL user, thought it up.

Abed reported that he sent out RMG and Mechanical Affinity catalogues to all TSNUG members.

Bob Told of the upcoming picnic in Peru Indiana. He was interested in meeting other Indiana users he had both talked to on the phone and read about in the ISTUG newsletter. He invited others to go with him to the ISTUG picnic, Steve Cooper showed some interest.

Abed asked about Dayton Tickets. Seems Swoger is the only one interested in going. Bob was asked to look for a serial interface.

Meeting adjourned at 2:52.

Bob gave a demo, on Steve Coopers TS2068/JLO, of the latest VuCalc which is now part of the LogiCall Ensemble.

Jim Brezina, Secretary  
Chicago Area Timex Users Group

**June 19, 1993**

Meeting called to order at 2:00 P.M. Those present were Bob Swoger, Nazir Pashtoon, Frank Mills, Steve Cooper, Abed Kahale and Larry Sauter. Jim Brezina, our secretary, is out due to eye surgery.

The annual Color Computer club picnic will be held August 15 this year. Three of our group will attend. The very exciting Yellow Jacket hunt will again be conducted with electric start propane torches.

Bob Swoger will provide LogiCall V5.0 to RMG and Mechanical Affinity with patches to operate on AERCO, JLO, and LarKen Fast systems.

Bob brought in two monitors to give away at the meeting. There were no takers!

Abed read a letter from Don Lambert. As to this date 12 new members have contributed to T/SNUG and 12 previous members have re-submitted.

Bob then talked about the ISTUG picnic he attended in Peru Indiana. He apologized for forgetting to bring the video he made while there.

Meeting adjourned at 2:45 P.M.

Larry Sauter, Acting Secretary  
Chicago Area Timex Users Group

## **GATOR's TWISTED PAIR**

!!! REMEMBER !!!  
We have a 24 hour BBS and encourage you to exchange mail and contribute to the Download Section. Use it and have fun!

Call the BBS at 708-632-5558 and register. On your next call your security level will be increased to 5 on this RBBS and you will be able to have most privileges.

Bob Swoger, SYSOP  
Chicago Area Timex Users Group

## **ITEMS FOR SALE THROUGH THE CLUB**

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It has come to our attention that some LarKen Users are using something less than Version 3 firmware. The club will supply updated EPROMs, SYSTEM DISKS, and MANUALS for just \$5 which includes shipping and handling, free if ordered with LogiCall or Spectrum ROM.  
=====

If you are a LarKen LKDOS owner and would like a SPECTRUM V2 kit for your system we will supply an EPROM, socket and 74HCT32 for \$12 which includes shipping and handling. The install instructions are in your LarKen manual. We shall not be responsible for your install job. AERCO owners need only the SPECTRUM EPROM for \$10  
=====

If you have a mismatch between you LarKen DOS EPROM and your Western Digital Controller chip, we will send you the correct one for free on behalf of our friends Rod Gowen of RMG and Larry Kenny of LarKen. You should be using L3 EPROMs with WD1770 controller chips or L3F EPROMs with WD1772 controller chips. Check it out! Call in requests to Bob Swoger at W708-576-8068 H708-837-7957

## **SPECIAL DEALS AND BUYS**

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NAP\_Ware (Nazir A. Pashtoon's new endeavor) announces the availability of all Timex or QL PAL (Programmable Array Logic) chips. If interested, call him evenings on 708-439-1679.  
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LogiCall Integrated Software Ensemble easy operating system for LKDOS in both TS2068 and Spectrum modes includes LogiCall 5.0 TASWORD TWO V2.8, VU-CALC V1.6, VU-FILE and

MTERM2 Drivers modified for LogiCall, DISKS.B1 TAPES.B1 steprt.B1 HEADER.BT (tape header reader by Nazir Pashtoon) FORMAT.B MOVE.BL and more all on 2 SSDD disks for \$15. You must specify your LKDOS EPROM version. If you already have a copy you are encouraged to distribute copies to other LarKen LKDOS users for as you see by the price we are not in the business of making money on it, just making LarKen's LKDOS even better! Call in requests to Rod Gowen of RMG Enterprises.

=====

So you like to fly? The 747 Flight Simulator for Spectrum by Derek Ashton of DACC sold over 40K copies in EUROPE. Requires Spectrum Emulator. At this time supplied on LarKen SSDD disk only for \$10 which goes to Derek Ashton, now working at MOTOROLA with Bob Swoger. Call in requests to Bob at W708-576-8068 H708-837-7957

## ARTICLES

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### PRINT OR LPRINT by James F. Brezina

Each new book I have bought on the TS2068 has taught me quite a bit about programming on the computer. The things I have learned lately on the keyword PRINT are quite interesting. The latest book I purchased, "Introduction to 2068 Machine Language" by Dr. Lloyd Dreger, explained quite a bit about it.

Many times I have entered programs with the command "PRINT#0;" or the command "PRINT #1;". I found that the command would cause whatever followed it (a string or numbers) to be printed on the bottom two lines of the screen. However, in order for that information to remain on the screen, one has to provide some means of preventing an error statement or INPUT from

appearing there. That can be done by a PAUSE or by following it with a long FOR-NEXT loop. All the PRINT # commands are to be followed by a semicolon.

Dr. Dreger's book informs me that "PRINT #2;" will PRINT to the upper screen which is the same thing that PRINT also does. The next PRINT command, "PRINT #3;", will send the printing to the printer. This will be either the 2040 printer or a full size printer as long as you have the printer driver LOADED and initialized.

Is there a PRINT #4,? Yes, I have found it used by the "ZTALKER". It is the means by which words are entered to make the "ZTALKER" talk. However, some words do not sound right if spelled normally, so you might have to misspell them to get the "ZTALKER" to sound right.

I have not seen anything about using anything above #4 in these PRINT statements in the above manner. I have seen them used in another manner which I will explain later on.

An interesting thing about this PRINT #3 setup is that you can also enter LIST #3 and it will LIST on the printer. Another thing you can do is with the LPRINT and LLIST commands. LPRINT#2 and LLIST #2 will go to the screen instead of the printer.

A number of years ago, I saw an article on one of the uses of the OPEN # command. This was originally intended for use with disks, however, it can also be used for printing without a disk system. The manner in which it was used was to enter "OPEN #2". The TS2068 will not let you enter "OPEN #2" alone but it will let you enter "CLOSE #2" by itself. To enter "OPEN #2" you must follow it with a comma (the comma is the only punctuation mark that works) and one of the following letters in quotation marks:



"S" for the upper part of the screen.

"K" for the lower part of the screen (with something like PAUSE to keep the PRINT on the screen)

"P" for printing to the printer (any kind as in "PRINT #3")

This will cause anything in a PRINT statement to go to where the letter indicates. The most useful way of ENTERing this command is, "OPEN #2,"P". After ENTERing this command, whether immediate mode or in a program, everything in the program that is in a PRINT statement will go to the printer. The simplest way of redirecting the PRINT to the screen is to enter "CLOSE #2". I have seen one article that said to enter "OPEN #2,"S", but, that to me is a waste of keystrokes and it still leaves the channel open.

I have found that the only channel that works this way is channel 2. You can use any one of the other 15 channels to send PRINT statements to the printer, but, you must follow them with the command: "PRINT #(channel you are using);" followed by what you want printed. An example of this is as follows:

```
10 OPEN #5,"P"
20 PRINT #5; "Mary had a
  little lamb"
30 CLOSE #5
```

A while back I found a little program (I believe it was in TS HORIZONS) that works like a simple word processor. The original program was written as follows:

```
10 INPUT AT 21,0; AT 0,0;
LINE A$
20 LPRINT A$
30 GO TO 10
```

When you run this program, a cursor appears at the top of the screen. As you enter letters, they are printed to the top of the screen and the cursor moves ahead of the

letters. The entered string does not have quotation marks. Almost everything works as normal except the down arrow. It is the BREAK key for this program. You can even use the CAPS LOCK for this program. You can enter GRAPHICS. When you press the ENTER key, what is on the screen is printed to the printer. The screen would then be erased. Of course, a full sized printer will not PRINT the GRAPHICS. You can also use the ENTER key for a LINEFEED. For a full sized printer, you will have to have your printer driver LOADED in and initialized.

I tried an alteration on the program by changing the 0,0 in line 10 to 1,0. Then I added a line 5 to PRINT the numbers through 0 all the way across the screen. I found that this line would remain on the screen at all times while the rest of the text would be erased with ENTER to PRINT to the printer. I also found that corrections could be made to the text. I also tried putting a semicolon after LPRINT A\$. This had a drawback as one had to add spaces to fill the printers buffer or the entire text would not be printed out.

In the September '86 issue of Time Designs Magazine, one writer asked if there was a way to get the 2068 to PRINT direct to the printer without using a monitor. Tim Woods answered that he knew of no way of doing this. The next issue contained quite a few letters in answer to that question, but, none of them really gave an answer to do what the writer wanted. One of the answers gave me the following idea, though it still does not do what the writer wanted.

```
5 POKE 23692,2
10 LET A$ = INKEY$: PRINT
A$;: LPRINT A$;
15 PAUSE 20
20 GO TO 5
```

The POKE 23692,2 makes the text on the screen scroll up when the screen fills instead of breaking out. The semicolons after the A\$ keeps the printing on one line, otherwise, there would only be one letter to a line. The PAUSE is necessary, for without it you would not be able to get your finger off a key fast enough for it not to repeat. What happens next is that the printer will PRINT out a line of text when the printer's buffer is full or when you key ENTER. This program has a number of disadvantages. There is no cursor on the screen. You cannot delete screen letters with the DELETE key. You can move the unseen cursor with the arrow keys and correct words on the screen, but, you cannot change what is in the printer's buffer. The result is that your mistakes are still printed by the printer. You can still break out of the program with the CAPS SHIFT & BREAK keys. CAPS LOCK cannot be used.

I tried a number of ways to make a cursor appear in the text on this program. I had no luck. Maybe one of you might find a way.

### **The Ultimate AUTOSTART**

by Bob Swoger

In the January 1993 Update! Magazine page 20, Peter Hyman gave a good clue to writing a better AUTOSTART program for the LarKen disk system. Like Peter, I have seen AUTOSTARTs that use two tracks. They are usually made from another program on the disk, sometimes called Menu.B1. Menu.B1 is provided to allow changes to the AUTOSTART program and is, therefore, identical to it. Three tracks on the disk now contain the same program!

AUTOSTART programs instruct the computer what to do when the machine is turned ON with the ENTER key held down or when the RAND USR 100: NEW sequence is typed in on either the TS2068

or SPECTRUM systems. Here are a few simple rules:

**RULE 1** The ULTIMATE AUTOSTART should do little more than reset RAMTOP, call another program from the disk (LOAD the program and RUN it) and save itself to that disk.

**RULE 2** The ULTIMATE AUTOSTART should be 5089 bytes long. Using the CHAMBERS UTILITIES disk, you will find that an AUTOSTART made in both the TS2068 mode and the SPECTRUM mode will always start at address 22490 and contain 5089 bytes.

**RULE 3** The ULTIMATE CLEAR number for both TS2068 and SPECTRUM is 27577. One need not execute the PRINT 65536-FREE misprinted in the UPDATE! article to find the lowest point to move RAMTOP, just use 27577 instead. The area saved will always be one track long, 5090-1 bytes.

Since many menu programs are too long to fit on a single track as an AUTOSTART SAVE in the TS2068 mode, (SPECTRUM gives us 2955 bytes more) I submit the following subprogram that could be included in any menu program to create AUTOSTART. Since this is the AUTOSTART program included within the lines of the LogiCall program, it is numbered accordingly:

```

49 LET H=CODE "d": LET Z=PEEK(
PI+PI)=CODE "1"
110 GO TO VAL "460-(30*Z)"
400 CLEAR VAL "65367"
410 REM RANDOMIZE USR CODE "d"
: OPEN # VAL "4","dd"
420 RANDOMIZE USR CODE "d": LO
AD "L.B1"
430 DELETE RND,VAL "399"
440 DELETE VAL "461",VAL"9999
"
450 DELETE VAL "421",VAL"459"
460 CLEAR VAL "27577":
RANDOMIZE USR CODE "f": GO TO V
AL "400"

```

In line 49, H is assigned the value 100 to save RAM space

when subsequent needs for the value 100 are needed. The heavy use of VAL and CODE is to save RAM space and will be explained later in this article.

LET Z = PEEK (PI+PI) = CODE "1" reduces down to LET Z = (PEEK 6 = 49) assigning Z the value 1 if the software finds itself running on the TS2068 and 0 if running on the SPECTRUM. EXPLANATION: If the TS2068 ROM is operating the system, byte 6 hold the value 49. The SPECTRUM ROM holds 203. Therefore, if the TS2068 ROM is operating, the boolean operator (PEEK 6=49) will be true and Z will equal 1. If the SPECTRUM ROM is operating, the boolean operator (PEEK 6=49) will be false and Z will equal 0.

Line 110 bypasses lines 430 to 450 in the Spec'y mode thus avoiding a crash since the SPECTRUM does not have a delete command.

Line 400 sets RAM TOP to a place compatible to fonts and other favorite machine code. You may choose any other number you like up to 65535.

Line 410 is included in case one MUST open stream/channel 4. Since opening stream/channel 4 conflicts with ZEBRA Talkers and eats up precious RAM space, it is REMarked out. Opening stream/channel 4 really has no added programming value in most cases. Just edit REM out if you need to open stream/channel 4.

Line 420 calls the start-up program.

Lines 430 to 450 delete all un-needed lines on the TS2068 from the program which contained this AUTOSTART sub-program thus keeping the required space to one track. This is not required on the SPECTRUM because: 1) not having a DELETE command in its vocabulary it can't delete lines! and 2) SPECTRUM gives us 2955 more bytes of program space on an AUTOSTART save.

Finally, line 460 sets RAM TOP to the ULTIMATE value which will save exactly 5089 bytes, exactly the size of one LarKen track, the AUTOSTART save routine is called, and 400 is given to the AUTOSTART header as the line to auto RUN once this program is loaded.

To use this sub-program, simply merge it into your favorite menu program using the appropriate re-numbering of the statements and cause some keyboard action to send it to the beginning statement of this sub-program. If you use it as a stand alone program, the DELETE statements can probably be removed. When the sub-program is executed, the NMI tone will sound and you will either have to press the 'D' key to continue the save to disk or the 'A' key to interrupt the program to change 'L.B1' to 'Menu.B1' in line 420 if you want to call Menu.B1 instead of LogiCall when you boot the disk. Next type GOTO 460 <ENTER> and 'D' after the tone to save the modified AUTOSTART.

My concern, however, is that you have not yet discovered LogiCall! Many folks who now use LogiCall have discovered that without it on every disk, LKDOS is a 'NAKED' system which requires you to do a lot of typing (i.e. RAND USR 100: GOTO 1: RAND USR 100: LOAD "filenm.B1" as an example of LOADING "filenm.B1" on drive 1). LogiCall creates the ULTIMATE AUTOSTART for you simply by pressing the 'A' key <ENTER> and 'D' at the 'Program?' prompt. Get and use LogiCall!

Because the AUTOSTART programs others have written often use two tracks, I have usually been able to find room on even a full disk to add LogiCall (L.B1) by using LogiCall's embedded AUTOSTART program to call the other person's Menu.B1 program on boot-up and the disk still works the way it did before I added LogiCall!



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## KEYBOARD MANIA - Part 3

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By Cedric R. Bastiaans ©

Page A

### IX. FITTING THE TI-99/4A KEYBOARD INTO THE TS 2068 CASE

The TI keyboard which flooded the market after the demise of the TI computer, offers a fine opportunity for you to try your hand at putting a full-travel keyboard to work for one of the finest computers around.

But first a word of warning: Neither LIST nor I can be held responsible for any damage resulting from these proceedings. Once you open up your computer, you are on your own, voiding all warranties, if any.

Also, if changing a light bulb means a major endeavour for you, maybe you should not attempt any of the following...

#### IX.1 WHICH KEYBOARD?

I know of at least two versions. THE FOLLOWING PROCEDURES ARE ONLY FOR ONE OF THEM! It may be that the other version lends itself to a like modification. But for now, I can only address myself to one item at a time.

The versions in question are (and I am putting the corresponding deviations for the WRONG version in parentheses):

Black keys with white legends (beige keys with grey).

Keys are a trifle hard to remove (easily removable).

Key switches are only numbered 1 through 48 (alpha-numerically indicated)

15-pin ribbon cable connector is numbered 1 thru 15, R to L (not numbered).

The PCB identifications are 1039019-1 (1039019-3), made in Japan (Korea), there is no TI-logo (there is), 94 V-0 (same), made by ALPS (by SE-JIN).

In addition, the PCB TRACES ARE TOTALLY DIFFERENT!

Also, it appears that the Alpha Lock key is not always a Push/Push type. You're in luck if it isn't (see later).

A dead give away is the fact that my keyboard has a RECESSED PCB, in contrast to the other one which has one which is very close to the mounting flanges

The TI keyboard can still be purchased from the Arnold Co. (new for \$5.99 + \$3 shipping), 214 Hill Lane, Red Oak TX 75154 or from the LOLIR ELECTRONICS CORP. (surplus for \$3.75 + \$3.50 shipping), 13933 N. Central Expressway, suite 212, Dallas TX 75243. If you want to order, I suggest you specifically ask for the ALPS keyboard.

Once again, it may be possible to modify the TS 2068 to accept the other KB. If there is enough interest, I just might endeavour to look into it. Write me c/o LIST. (See Note at the end of this article).

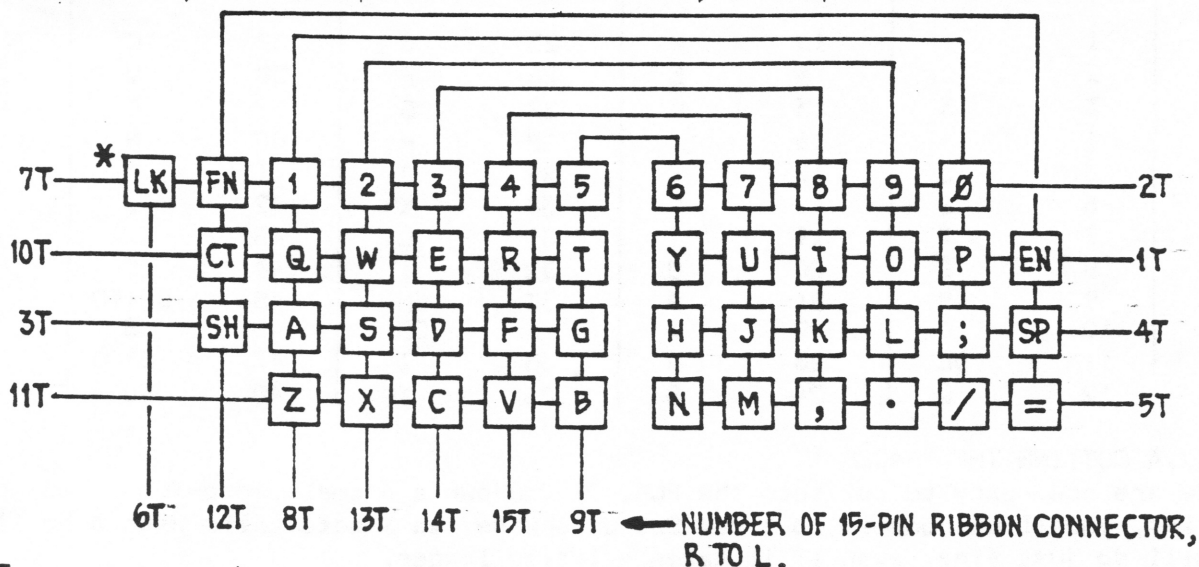
#### IX.2 THE TI MATRIX

The TI matrix is shown in Figure 9. Note that I have labeled the KBD and the A-lines as 1T, 2T etc. This to avoid confusion with the TS 2068 matrix.

At first glance there appears to be a similarity between it and the TS 2068. Aside from the obvious deviations in the 8 keys, . / ; = CNTL FCTN and Alpha Lock, there is a major problem in that the entire bottom row is shifted over one key!

But fear not, we can lick it. Let's first discuss what to do with the dedicated key functions. It should be obvious that there is no room for such elaborate IC functions as described in Chapter VII of Part 2 of this series. But there remain





\* = PUSH/PUSH TYPE    LK = LOCK    FN = <sup>NOTE:</sup>FUNCTION    CT = CONTROL    SH = SHIFT

allow the punctuation marks to work, nor the numbers, nor the Symbol Shift. It is only useful with the cursor keys and of course the letters.

That's why I elected to use the Alpha Lock key as an asterisk key, to use with the Zebra Disk Drive. One just has to get used to operating it in a quick Push/Push fashion, so as not to cause it to go into a continuous repetition of the character! I have tried in vain, to modify this key. I leave it up to the reader to do with it as he or she sees fit. No further reference will be made to this key, not even as an asterisk key!

## IX.3 THE MODIFIED TI MATRIX

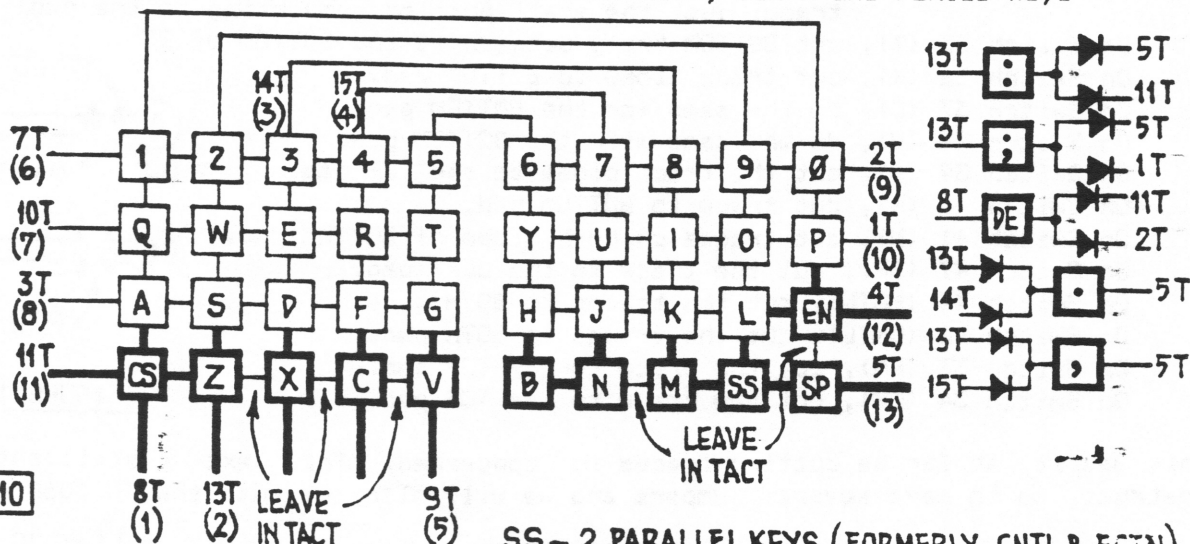
Figure 10 shows the TI keyboard as we would want it to be. Quite obviously, the dedicated keys are:

Key Switch 11, for the DELETE key

Key Switch 22, for the COLON key

Key Switch 46 and 48, for the SYMBOL SHIFT keys

Key Switch 32, 42 and 43 for the SEMICOLON, COMMA and PERIOD keys:



**FIGURE 10**

**NOTE :**

**[M]** = NEW KEY, WITH EXISTING  
LINE AND A NEW LINE

SS = 2 PARALLEL KEYS (FORMERLY CNTL & FCTN)

: = FORMERLY /-KEY

DE = FORMERLY -- KEY

This seems like a good time to list all the keys, as we have now defined it:

Switch #	Key	Switch #	Key	Switch #	Key	Switch #	Key
1	1	13	W	25	D	37	C
2	2	14	E	26	F	38	V
3	3	15	R	27	G	39	B
4	4	16	T	28	H	40	N
5	5	17	Y	29	J	41	M
6	6	18	U	30	K	42	,
7	7	19	I	31	L	43	.
8	8	20	O	32	;	44	CS
9	9	21	P	33	EN	45	OPTION
10	0	22	:	34	CS	46	SS
11	DE	23	A	35	Z	47	SP
12	Q	24	S	36	X	48	SS

#### IX.4 CUTTING THE TRACES

We are now ready to cut into the PCB. If you own a Dremel Moto-Tool kit or the like, you'll be done in no time. But otherwise, an X-acto knife with a No.11 blade will do just fine, even if it takes a little longer.

The following list will take you step by step; put the PCB with the 15-pin connector on top, traces of course towards you.

If you're ordered to cut a trace, draw the X-acto knife towards you, taking care not to inadvertently cut adjacent traces. You may find that an additional cut or two may help. Now, move the X-acto blade over about 1/16th of an inch and repeat. Next, gently pry the thusly cut trace away, see Figure 11.

Don't be afraid, there is really nothing to it. And if you find that you cut the wrong trace, don't despair. It is always possible to put a jumper back to where you erroneously cut the trace. But why not try to avoid errors all together?

On Switch 45 (LK), cut BOTH traces close to the solderpads.

On Switch 11 (=), cut BOTTOM trace close to pad, UPPER trace on both sides.

On Switch 32 (;), cut trace close to TOP pad.

On Switch 22 (/), cut TOP trace next to pad, BOTTOM trace ONLY to the right of it!

On Switch 42 (,), cut traces on both sides of BOTTOM pad.

On Switch 43 (.), cut trace to BOTTOM pad. Careful! Don't cut the major trace; just the small portion connecting to the pad!

On Switch 35 (Z), cut BOTTOM trace between it and BOTTOM of 23.

On Switch 36 (X), cut trace close to BOTTOM pad.

On Switch 37 (C), do the same for the BOTTOM pad.

On Switch 38 (V), do the same with the BOTTOM pad.

On Switch 39 (B), cut the trace close to the TOP pad.

On Switch 40 (N), cut trace to BOTTOM pad.

On Switch 41 (M), cut traces on both sides of BOTTOM pad.

On Switch 47 (SP), cut the trace to the LEFT pad.

On Switch 48 (FCTN), cut the traces to BOTH pads.

On Switch 46 (CNTL), cut the traces to BOTH pads.

On Switch 33 (EN), cut the trace to the TOP pad.

On Switch 34 (CS), cut the trace to the TOP pad.

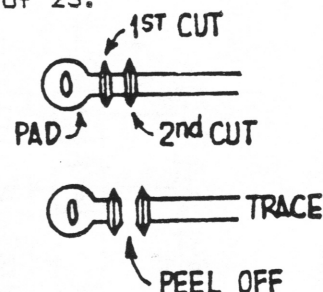


FIGURE 11

This was it, as far as cutting traces is concerned. The next installment will instruct you to make several jumpers and we will also cut into the TS 2068 case!

Note:

---000000000---

© Cedric Bastiaans

The Author is pleased to announce that he has found a way to put the Korean-made SE-JIN keyboard into the TS 2068 case! The Japanese-made ALPS keyboard is STILL to be preferred, though. See the upcoming installments in this Keyboard Mania series...